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Forthcoming Papers

M. Yokoo, Y. Sakurai and S. Matsubara, Robust combinatorial auction protocol against false-name bids

This paper presents a new combinatorial auction protocol that is robust against false-name bids. Internet auctions have become an integral part of Electronic Commerce (EC) and a promising field for applying agent and Artificial Intelligence technologies. Although the Internet provides an excellent infrastructure for combinatorial auctions, we must consider the possibility of a new type of cheating, i.e., an agent tries to profit from submitting several bids under fictitious names (false-name bids). If there exists no false-name bid, the Generalized Vickrey Auction protocol (GVA) satisfies individual rationality, Pareto efficiency, and incentive compatibility. On the other hand, when false-name bids are possible, it is theoretically impossible for a combinatorial auction protocol to simultaneously satisfy these three properties.

Our newly developed Leveled Division Set (LDS) protocol, which is a modification of the GVA, utilizes reservation prices of auctioned goods for making decisions on whether to sell goods in a bundle or separately. The LDS protocol satisfies individual rationality and incentive compatibility even if agents can submit false-name bids, although it is not guaranteed to achieve a Pareto efficient social surplus. Simulation results show that the LDS protocol can achieve a better social surplus than that for a protocol that always sells goods in one bundle.

C. Bailey-Kellogg and F. Zhao, Influence-based model decomposition for reasoning about spatially distributed physical systems

Many important science and engineering applications, such as regulating the temperature distribution over a semiconductor wafer and controlling the noise from a photocopy machine, require interpreting distributed data and designing decentralized controllers for spatially distributed systems. Developing effective computational techniques for representing and reasoning about these systems, which are usually modeled with partial differential equations (PDEs), is one of the major challenge problems for qualitative and spatial reasoning research.

This paper introduces a novel approach to decentralized control design, *influence-based model decomposition*, and applies it in the context of thermal regulation. Influence-based model decomposition uses a decentralized model, called an *influence graph*, as a key data abstraction representing influences of controls on distributed physical fields. It serves as the basis for novel algorithms for control placement and parameter design for distributed systems with large numbers of coupled variables. These algorithms exploit physical knowledge of locality, linear superposability, and continuity,

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encapsulated in influence graphs representing dependencies of field nodes on control nodes. The control placement design algorithms utilize influence graphs to decompose a problem domain so as to decouple the resulting regions. The decentralized control parameter optimization algorithms utilize influence graphs to efficiently evaluate thermal fields and to explicitly trade off computation, communication, and control quality. By leveraging the physical knowledge encapsulated in influence graphs, these control design algorithms are more efficient than standard techniques, and produce designs explainable in terms of problem structures.

Six reviews of Robert A. Wilson and Frank C. Keil's *The MIT Encyclopedia of the Cognitive Sciences* by C. Carr, B.J. Dorr, Ph. Husbands, G. Lakoff, Y. Okamoto, and D.M. Peterson. Responses by F.C. Keil and R.A. Wilson

Y.P. Singh and P. RoyChowdhury, Dynamic tunneling based regularization in feedforward neural networks

This paper presents a new regularization method based on dynamic tunneling for enhancing generalization capability of multilayered neural networks. The proposed method enables escape through undesired sub-optimal solutions on the composite error surface by means of dynamic tunneling. Undesired sub-optimal solutions may be increased or introduced from regularized objective function. Hence, the proposed method is capable of enhancing the regularization property without getting stuck at sub-optimal values in search space. The regularization property and escape from the sub-optimal values have been demonstrated through computer simulations on two examples.

G. Sutcliffe and Ch. Suttner, Evaluating general purpose automated theorem proving systems

T. Ibaraki, A. Kogan and K. Makino, On functional dependencies in q-Horn theories (Research Note)

J. Delgrande, A. Gupta and T. Van Allen, A comparison of point-based approaches to qualitative temporal reasoning